REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	1.3, absolute maximun ratings, change input voltage range. Editorial changes throughout.	1990 AUG 14	W. Heckman

REV																				
SHEET																				
REV																				
SHEET																				

REV STATUS OF SHEETS																
REV	A	A	A								A	A	A			
SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13			

PMIC N/A

STANDARDIZED MILITARY DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

PREPARED BY
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CHECKED BY
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Michael A. Frye

DRAWING APPROVAL DATE
8 MARCH 1988

REVISION LEVEL
A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, DIGITAL, BIPOLAR, BIDIRECTIONAL TRANSCEIVERS, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	**67268**	**5962-88604**

SHEET 1 OF 13

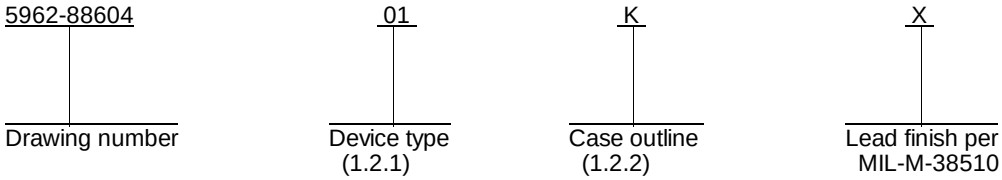
DESC FORM 193
JUL 94

5962-E1742

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device types. The device types shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	29861A	High performance 10-bit bidirectional transceiver, three-state
02	29863A	High performance 9-bit bidirectional transceiver, three-state

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
K	F-6 (24-lead, .640" x .420" x .090"), flat package
L	D-9 (24-lead, 1.280" x .310" x .200"), dual in line package
3	C-4 (28-terminal, .460" x .460" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V dc to +7.0 V dc
Input voltage range	-1.5 V dc to +6.0 V dc
Storage temperature range	-65°C to +150°C
Maximum power dissipation (P_D) 1/	2.2 W
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (Θ_{JC}):	
Cases K, L, and 3	See MIL-M 38510, appendix C
Junction temperature (T_J)	150°C/W
DC output voltage range	-0.5 V dc to 5.5 V dc
DC output current: Into output	+100 mA
DC ouput current: Out of output	-50 mA
DC input current range: Into input	-30 mA to +5.0 mA

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	+4.5 V dc to +5.5 V dc
Minimum high level input voltage (V_{IH})	2.0 V dc
Maximum low level input voltage (V_{IL})	0.7 V dc
Case operating temperature range (T_C)	-55°C to +125°C

1/ Must withstand the added P_D due to short circuit test; e.g., I_{OS}.

2. APPLICABLE DOCUMENTS

2.1 Government specification, standard, and bulletin. Unless otherwise specified, the following specification, standard, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawing (SMD's).

(Copies of the specification, standard, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Truth tables. The truth tables shall be as specified on figure 2.

3.2.3 Logic diagrams. The logic diagrams shall be as specified on figure 3.

3.2.4 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and apply over the full case operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ $4.5\ V \le V_{CC} \le 5.5\ V$ unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
High level output voltage	V_{OH}	V_{CC} = 4.5 V $V_{IN} = V_{IL}$ or V_{IH}	I_{OH} = -15 mA	1, 2, 3	All	2.4		V
			I_{OH} = -24 mA			2.0		
Low level output voltage	V_{OL}	V_{CC} = 4.5 V, I_{OL} = 32 mA $V_{IN} = V_{IH}$ or V_{IL}		1, 2, 3	All		0.5	V
Input clamp voltage	V_{IC}	V_{CC} = 4.5 V, I_{IN} = -18 mA		1, 2, 3	All		-1.2	V
Input hysteresis	V_{HYST}			1, 2, 3	All	200		mV
Low level input current	I_{IL}	V_{CC} = 5.5 V, V_{IN} = 0.4 V $\overline{OE}$ input		1, 2, 3	All		-0.5	mA
High level input current	I_{IH}	V_{CC} = 5.5 V, V_{IN} = 2.7 V $\overline{OE}$ input		1, 2, 3	All		50	µA
High input current	I_I	V_{CC} = 5.5 V V_{IN} = 5.5 V	$\overline{OE}$ input	1, 2, 3	All		100	µA
			I/O port				150	
Output off-state (high impedence) output current	I_{OZH}	V_{CC} = 5.5 V	V_{OUT} = 2.7 V	1, 2, 3	All		100	µA
	I_{OZL}		V_{OUT} = 0.4 V				-550	
Output short circuit current	I_{OS}	V_{CC} = 5.5 V, V_{OUT} = 0.0 V 1/		1, 2, 3	All	-75	-250	mA

See footnote at end of table.

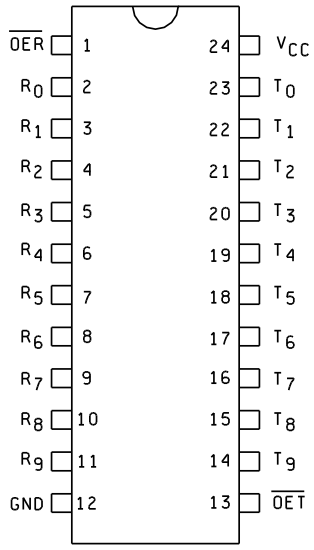
TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ $4.5\ V \le V_{CC} \le 5.5\ V$ unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
Bus leakage current	I_{OFF}	V_{CC} = 0.0 V, V_{OUT} = 2.9 V		1, 2, 3	All		100	µA
Supply current	I_{CC}	V_{CC} = 5.5 V Outputs unloaded	Output logic low	1, 2, 3	All		140	mA
			Output logic high				115	
			Output logic Hi-Z				130	
Propagation delay from Ri to Ti or Ti to Ri	t_{PLH}	See figure 4 C_L = 50 pF R_1 = 500Ω R_2 = 500Ω		9,10,11	All		9.0	ns
Propagation delay from Ri to Ti or Ti to Ri	t_{PHL}			9,10,11	All		9.0	ns
Output enable time OET to Ti or OER to Ri	t_{PZH}			9,10,11	All		12.0	ns
Output enable time OET to Ti or OER to Ri	t_{PZL}			9,10,11	All		13.0	ns
Output disable time OET to Ti or OER to Ri	t_{PHZ}			9,10,11	All		10.0	ns
Output disable time OET to Ti or OER to Ri	t_{PLZ}			9,10,11	All		10.0	ns

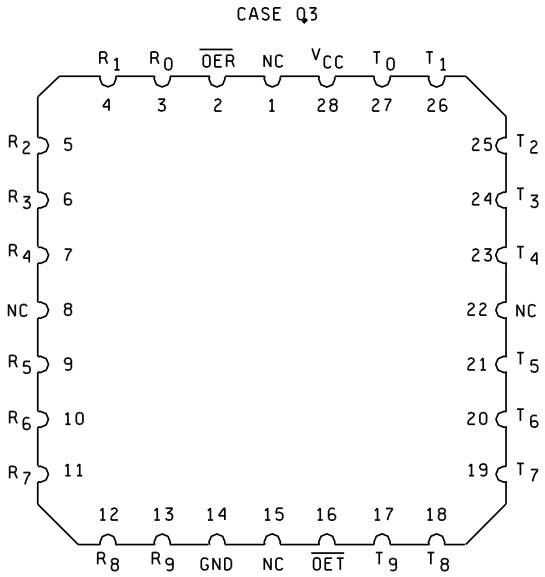
1/ Not more than one output should be shorted at a time. Duration should not exceed 1 second.

DEVICE TYPE 01

CASES K AND L

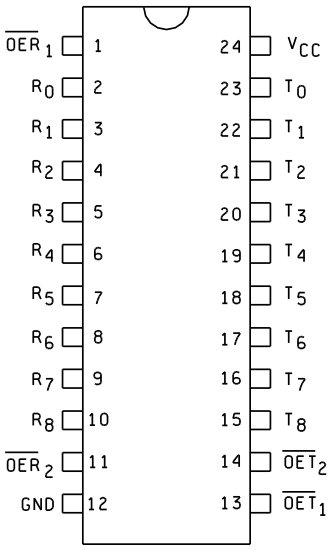


CASE Q3



DEVICE TYPE 02

CASES K AND L



CASE 03

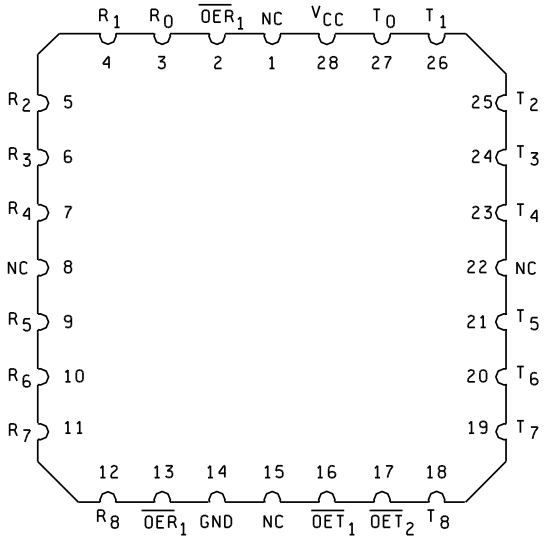


FIGURE 1. Terminal connections.

Device type 01

Inputs				Outputs		Function
$\overline{OET}$	$\overline{ORE}$	R_i	T_i	R_i	T_i	
L	H	L	N/A	N/A	L	Transmit
L	H	H	N/A	N/A	H	Transmit
H	L	N/A	L	L	N/A	Receive
H	L	N/A	H	H	N/A	Receive
H	H	X	X	Z	Z	Hi-Z

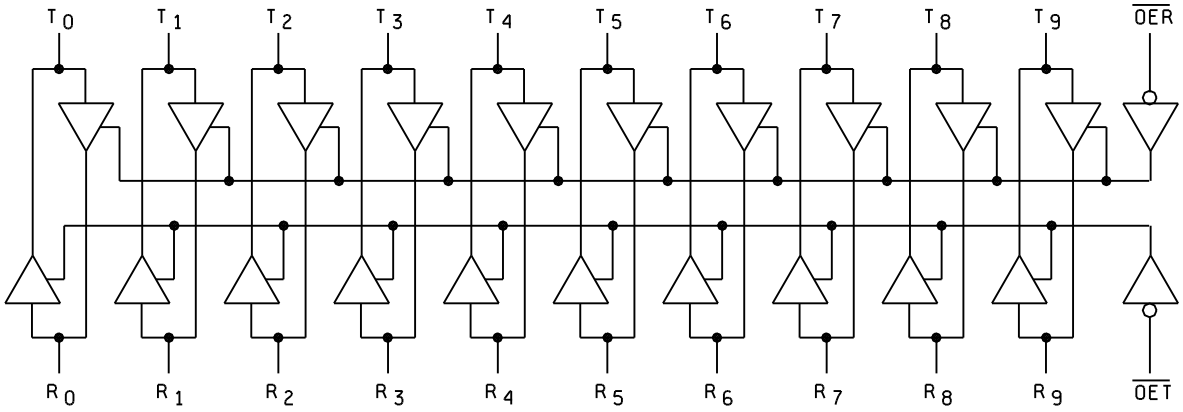
Device type 02

Inputs						Outputs		Function
$\overline{OET}_1$	$\overline{OET}_2$	$\overline{OER}_1$	$\overline{OER}_2$	R_i	T_i	R_i	T_i	
L	L	H	X	L	N/A	N/A	L	Transmit
L	L	X	H	L	N/A	N/A	L	Transmit
H	X	L	L	N/A	L	L	N/A	Receive
X	H	L	L	N/A	L	L	N/A	Receive
L	L	H	X	H	N/A	N/A	H	Transmit
L	L	X	H	H	N/A	N/A	H	Transmit
H	X	L	L	N/A	H	H	N/A	Receive
X	H	L	L	N/A	H	H	N/A	Receive
H	X	H	X	X	X	Z	Z	Hi-Z
X	H	X	H	X	X	Z	Z	Hi-Z

H = High
L = Low
Z = High impedance
X = Don't care
N/A = Not applicable

FIGURE 2. Truth tables.

DEVICE TYPE 01



DEVICE TYPE 02

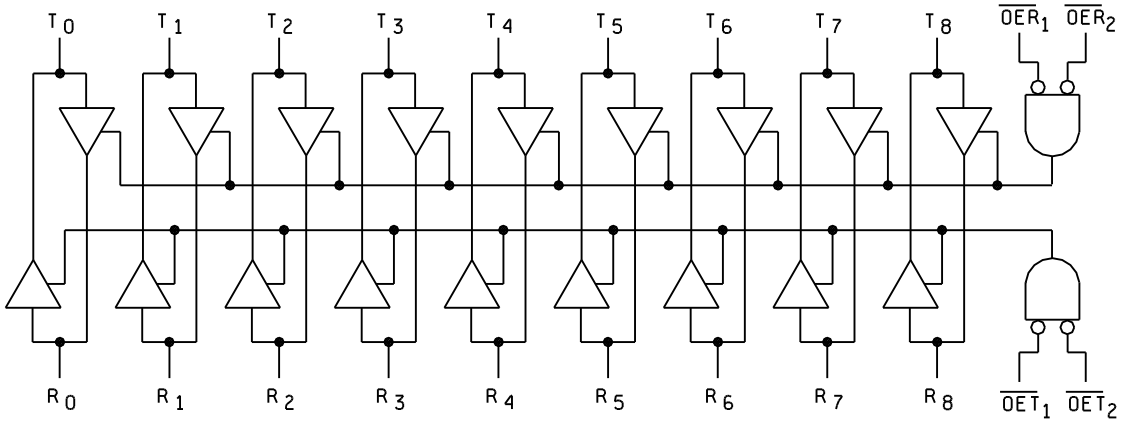
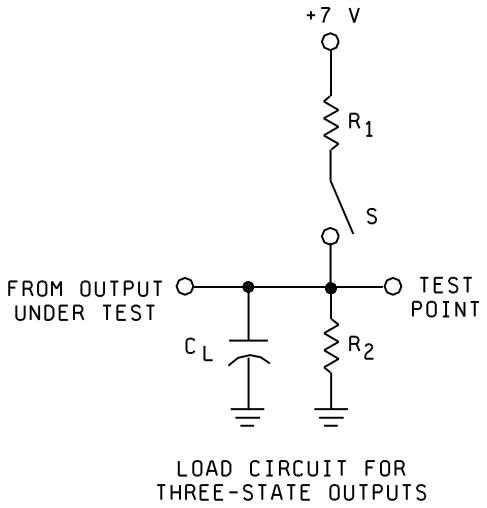


FIGURE 3. Logic diagrams.



LOAD CIRCUIT FOR
THREE-STATE OUTPUTS

Parameter	S position
t_{PLH}	Open
t_{PHL}	Open
t_{PHZ}	Open
t_{PZH}	Open
t_{PLZ}	Closed
t_{PZL}	Closed

Switch positions for parameter testing.

ENABLE AND DISABLE TIMES

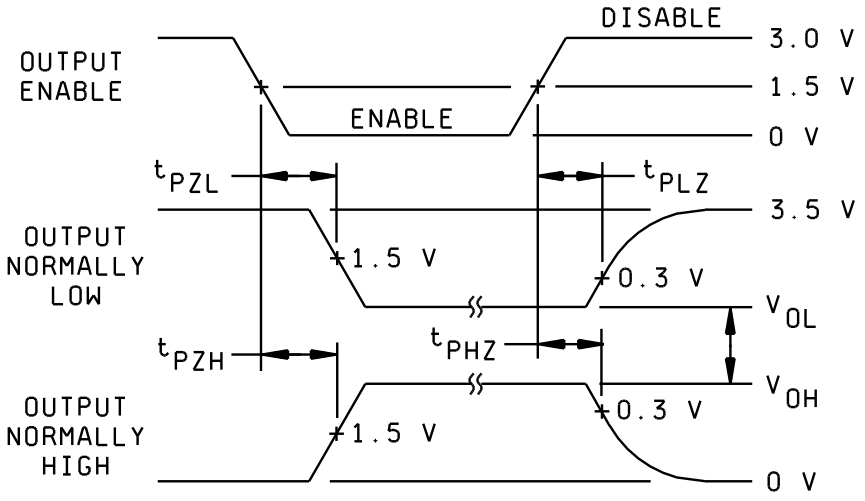
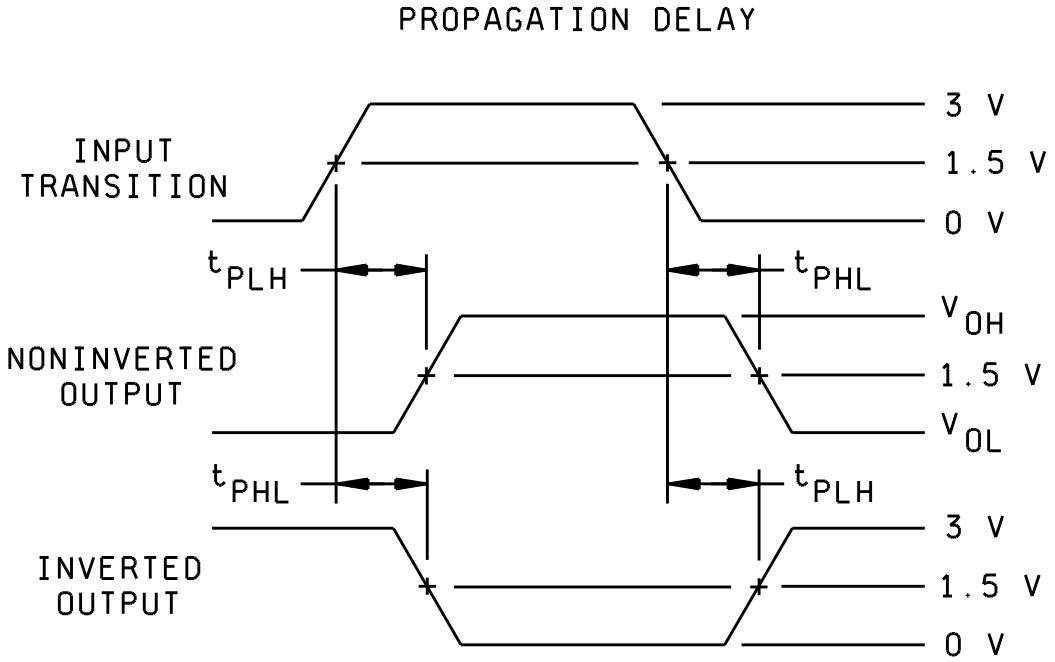


FIGURE 4. Switching waveforms and test circuits.



NOTE: Pulse generator for all pulses, rate $\leq$ 1.0 MHz; Z_o = 50Ω;
$t_r \leq$ 1.5 ns; $t_f \leq$ 2.5 ns.

FIGURE 4. Switching waveforms and test circuits - Continued.

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DESC-ECC shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.9 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°C, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 4, 5, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroups 7 and 8 testing shall include verification of the truth tables.

4.3.2 Groups C and D inspections.

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition A using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*,2,3,7*,8, 9,10,11
Group A test requirements (method 5005)	1,2,3,7,8, 9,10,11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroups 1 and 7.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-ECC, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECC, Dayton, Ohio 45444, or telephone (513) 296-8525.

6.6 Approved source of supply. An approved source of supply is listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 as they become available. The vendor listed in MIL-BUL-103 has agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECC. The approved source listed below is for information purposes only and is current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor similar part number 1/
5962-8860401KX	34335	AM29861A/BKA
5962-8860401LX	34335	AM29861A/BLA
5962-88604013X	34335	AM29861A/B3A
5962-8860402KX	34335	AM29863A/BKA
5962-8860402LX	34335	AM29863A/BLA
5962-88604023X	34335	AM29863A/B3A

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number	Vendor name and address
34335	Advanced Micro Devices, Incorporated 901 Thompson Place P.O. Box 3453 Sunnyvale, CA 94088